

## CLAIMS

We claim:

1. Process for preparing a phytolipid composition comprising squalene, phytosterols, tocopherols and vegetable wax which comprises the steps of, in order:
  - (1) distilling a vegetable oil by-product comprised of mixed tocopherols, fatty acids, hydrocarbons, vegetable waxes, sterol esters of fatty acids, sterols, triterpenoid alcohols, squalene, methyl-sterols, and mono-, di-, and triglycerides at a temperature of about 170 to 320°C and a pressure of about 0.1 to 35 torr to produce (i) a vapor product comprising fatty acids and low boiling hydrocarbons and (ii) a liquid product;
  - (2) distilling the liquid product of step (1) at a temperature of about 230 to 300°C and a pressure of about 0.0005 to 1 torr to produce (i) a second vapor product comprising a mixed tocopherols concentrate, squalene, phytosterols, and vegetable wax and (ii) a second liquid product;
  - (3) intimately contacting the condensed vapor product from step (2) with an extractant selected from alkanols and mixtures of acetone and water followed by separation of the resulting mixture into two phases comprising (i) a first phase comprising a majority of the extractant and (ii) a second phase comprising a majority of the condensed vapor effluent from step (2);
  - (4) collecting the second phase formed in step (3);
  - (5) cooling the first phase formed in step (3) to effect formation of a precipitate followed by collection of the precipitate; and
  - (6) combining the second phase collected in step (4) with the precipitate collected in step (5) and removing extractant employed in step (3) from the materials collected in steps (4) and (5);whereby a phytolipid composition comprising about 15 to 40 weight percent squalene, about 10 to 40 weight percent phytosterols, about 1 to 10 weight percent of mixed tocopherols and about 25 to 60 weight percent vegetable wax is obtained.

2. Process according to Claim 1 wherein the vegetable oil by-product is derived from palm oil or rice bran oil and the phytolipid composition obtained comprises about 20 to 35 weight percent squalene, about 15 to 35 weight percent phytosterols, about 2 to 8 weight percent of mixed tocopherols, about 30 to 55 weight percent vegetable wax and less than 0.1 weight percent extractant/solvent.

3. Process for preparing a phytolipid composition comprising squalene, phytosterols, tocopherols and vegetable wax which comprises the steps of, in order:

- (1) distilling a vegetable oil by-product comprised of mixed tocopherols, fatty acids, hydrocarbons, vegetable waxes, sterol esters of fatty acids, sterols, triterpenoid alcohols, squalene, methyl-sterols, and mono-, di-, and triglycerides at a temperature of about 170 to 320°C and a pressure of about 0.1 to 35 torr to produce (i) a vapor product comprising fatty acids and low boiling hydrocarbons and (ii) a liquid product;
- (2) distilling the liquid product of step (1) at a temperature of about 230 to 300°C and a pressure of about 0.0005 to 1 torr to produce (i) a second vapor product comprising a mixed tocopherols concentrate, squalene, phytosterols, and vegetable wax and (ii) a second liquid product;
- (3) intimately contacting the condensed vapor effluent from step (2) with an extractant selected from alkanols and mixtures of acetone and water followed by separation of the resulting mixture into two phases comprising (i) a first phase comprising a majority of the extractant and (ii) a second phase comprising a majority of the condensed vapor effluent from step (2);
- (4) collecting the second phase formed in step (3) and removing extractant employed in step (3);
- (5) cooling the first phase formed in step (3) to effect formation of a precipitate followed by collection of the precipitate and removal of extractant employed in step (3); and
- (6) combining the second phase collected in step (4) with the precipitate collected in step (5);

whereby a phytochemical composition comprising about 15 to 40 weight percent squalene, about 10 to 40 weight percent phytosterols, about 1 to 10 weight percent of mixed tocopherols and about 25 to 60 weight percent vegetable wax is obtained.

4. Process according to Claim 3 wherein the vegetable oil by-product is derived from palm oil or rice bran oil and the phytochemical composition obtained comprises about 20 to 35 weight percent squalene, about 15 to 35 weight percent phytosterols, about 2 to 8 weight percent of mixed tocopherols, about 30 to 55 weight percent vegetable wax and less than 0.1 weight percent extractant/solvent.

5. Process for preparing a phytochemical composition comprising squalene, phytosterols, tocopherols and vegetable wax which comprises the steps of, in order:

- (1) distilling a rice bran oil by-product comprised of mixed tocopherols, fatty acids, hydrocarbons, vegetable waxes, sterol esters of fatty acids, sterols, triterpenoid alcohols, squalene, methyl-sterols, and mono-, di-, and triglycerides at a temperature of about 240 to 290°C and a pressure of about 0.2 to 20 torr to produce (i) a vapor product comprising fatty acids and low boiling hydrocarbons and (ii) a liquid product;
- (2) distilling the liquid product of step (1) at a temperature of about 230 to 260°C and a pressure of about 0.005 to 0.5 torr to produce (i) a second vapor product comprising a mixed tocopherols concentrate, squalene, phytosterols, and vegetable wax and (ii) a second liquid product;
- (3) intimately contacting the condensed vapor effluent from step (2) with an extractant selected from methanol, ethanol, propanol and 2-propanol wherein the volume:volume ratio of extractant:condensed vapor effluent from step (2) is about 6:1 to 12:1 followed by separation of the resulting mixture into two phases comprising (i) a first phase comprising a majority of the extractant and (ii) a second phase comprising a majority of the condensed vapor effluent from step (2);
- (4) collecting the second phase formed in step (3);

- (5) cooling the first phase formed in step (3) to effect formation of a precipitate followed by collection of the precipitate; and
- (6) combining the second phase collected in step (4) with the precipitate collected in step (5) and heating the materials collected in steps (4) and (5) at a temperature of about 50 to 100°C and a pressure of about 200 to 1 Torr to remove extractant employed in step (3);

whereby a phytolipid composition comprising about 20 to 35 weight percent squalene, about 15 to 35 weight percent phytosterols, about 2 to 8 weight percent of mixed tocopherols, about 30 to 55 weight percent vegetable wax and less than 0.1 weight percent extractant/solvent is obtained.

6. Process according to Claim 5 wherein the extractant employed in step (3) is methanol and the phytolipid composition obtained contains less than 100 ppm methanol.

7. A phytolipid composition consisting essentially of about 15 to 40 weight percent squalene, about 10 to 40 weight percent phytosterols, about 1 to 10 weight percent of mixed tocopherols and about 25 to 60 weight percent vegetable wax and contains less than 0.1 weight percent solvent.

8. A phytolipid composition according to Claim 7 derived from rice bran oil and consisting essentially of about 20 to 35 weight percent squalene, about 15 to 35 weight percent phytosterols, about 4 to 8 weight percent of mixed tocopherols, about 30 to 55 weight percent vegetable wax and less than 0.1 weight percent solvent.

9. A phytolipid composition according to Claim 8 further characterized by the following properties: an iodine number of about 50 to 70; a saponification number of about 15 to 35 mg KOH per g lipid composition; a melting range of about 30 to 55°C; an acid number of less than about 2 mg KOH per g lipid composition; and a peroxide value of less than about 10 milliequivalents per kg lipid composition.

10. A skin care preparation intended for application to human skin comprising the phytolipid composition obtained from the process of Claim 1.

11. A skin care preparation intended for application to human skin comprising the phytolipid composition defined in Claim 7.

12. A skin care preparation intended for application to human skin comprising the phytolipid composition defined in Claim 8.

13. A lip balm comprising the phytolipid composition obtained from the process of Claim 1.

14. A lip balm comprising the phytolipid composition defined in Claim 7.

15. A lip balm comprising the phytolipid composition defined in Claim 8.

16. A lip balm comprising 10 to 60 weight percent wax and 40 to 90 weight percent of the phytolipid composition defined in Claim 7.

17. A lip balm according to Claim 16 wherein the wax is paraffin, candelilla wax or a mixture thereof.

18. A lip balm comprising 10 to 80 weight percent petrolatum and 20 to 90 weight percent of the phytolipid composition defined in Claim 7.

19. A skin care preparation intended for application to human skin comprising an emulsion of water and the phytolipid composition obtained from the process of Claim 2.

20. A skin care preparation intended for application to human skin comprising an emulsion of water and the phytolipid composition defined in Claim 9 wherein phytolipid composition:water weight ratio is about 1:50 to 2:1.
21. A food product comprising a phytolipid composition obtained from the process of Claim 1.
22. A food product according to Claim 21 comprising a margarine, light spread, mustard or mayonnaise and a phytolipid composition according to Claim 7.
23. A food product according to Claim 21 comprising a product containing milk fat and a phytolipid composition according to Claim 7.
24. A food product according to Claim 21 comprising a vegetable oil and a phytolipid composition according to Claim 7.
25. A food product according to Claim 21 comprising a fat-containing beverage and a phytolipid composition according to Claim 7.
26. A food product according to Claim 21 comprising an alcohol-containing beverage and a phytolipid composition according to Claim 7.
27. A food product according to Claim 21 comprising water, ethanol and a fat having dissolved or dispersed therein a phytolipid composition according to Claim 7.
28. A dietary supplement or therapeutic preparation for oral consumption comprising an oil and a phytolipid composition according to Claim 7.

29. A dietary supplement or therapeutic preparation according to Claim 28 comprising an oil having dissolved or dispersed therein from about 1 to 10,000 ppm by weight of the phytolipid composition.

30. A dietary supplement or therapeutic preparation according to Claim 28 in a unit dosage form comprising a capsule containing an oil and the phytolipid composition.

31. A dietary supplement or therapeutic preparation according to Claim 28 in a unit dosage form comprising a capsule containing an oil having dissolved or dispersed therein from about 1 to 10,000 ppm by weight of the phytolipid.

32. A dietary supplement or therapeutic preparation according to Claim 28 in a unit dosage form comprising a soft gelatin capsule containing an oil having dissolved or dispersed therein from about 1 to 10,000 ppm by weight of the phytolipid.